CLAIMS

1. A interconnecting unit for electrically coupling a microelectronic die having an integrated circuit to voltage sources and signal sources, the interconnecting unit comprising:

a substrate having a cap-zone defined by an area that is to be encapsulated by a protective casing, a plurality of interconnects having a plurality of first elements in the cap-zone, a plurality of second elements arranged in an array outside of the cap-zone, and a plurality of transmission lines coupling the first elements to the second elements; and

a gasket attached to the substrate outside of the cap-zone, wherein at least a portion of the gasket is adjacent to at least a portion of the cap-zone.

2. The interconnecting unit of claim 1 wherein:

the substrate has a die-side to which the die is to be attached and the cap-zone is on the die-side surrounding the contact array; and

the gasket is a thin film disposed on the die-side of the substrate such that the thin film surrounds the cap-zone.

3. The interconnecting unit of claim 2 wherein the thin film is a pliable tape applied to the substrate.

4. The interconnecting unit of claim 2 wherein the thin film is a polymeric film deposited on the substrate.

5. The interconnecting unit of claim 1 wherein:

the substrate has a slot, a die-side to which the die is to be attached, and a wire-side opposite the die-side;

the first elements of the interconnects comprise a plurality of contact elements being arranged in a contact array adjacent to the slot on the wire-side of the substrate such

that the cap-zone surrounds the contact array and the slot on the wire-side of the substrate, the second elements comprise ball-pads arranged outside of the cap-zone on the wire-side of the substrate, and the transmission lines comprise electrically conductive lines; and

the gasket is a thin film disposed on the wire-side of the substrate such that the thin film surrounds the cap-zone.

6. The interconnecting unit of claim 5 wherein the thin film is a pliable tape applied to the substrate.

7. The interconnecting unit of claim 5 wherein the thin film is a polymeric film deposited on the substrate.

8. The interconnecting unit of claim 1 wherein:

the substrate has a slot, a die-side to which the die is to be attached, and a wire-side opposite the die-side;

the first elements of the interconnects comprise a plurality of contact elements being arranged in a contact array adjacent to the slot on the wire-side of the substrate such that the cap-zone includes a first cap region surrounding the contact array and the slot on the wire-side of the substrate and a second cap region surrounding an area on the die-side that is covered by the die when the die is attached to the substrate, the second elements comprise ball-pads arranged outside of the first cap region on the wire-side of the substrate, and the transmission lines comprise electrically conductive lines; and

the gasket comprises a first thin film disposed on the die-side of the substrate surrounding the first cap region and a second thin film disposed on the wire-side of the substrate surrounding the second cap region.

9. The interconnecting unit of claim 8 wherein the first and second thin films are pliable tape sections.

10. The interconnecting unit of claim 8 wherein the first and second thin films are polymeric films.

11. The interconnecting unit of claim 1 wherein the gasket is a piece of tape adhered to the substrate, the tape having an opening with edges bordering the cap-zone.

12. The interconnecting unit of claim 1 wherein the gasket is a compressible film material adhered to the substrate, the film having an opening with edges bordering the cap-zone.

13. A interconnecting unit for electrically coupling a microelectronic die having an integrated circuit to voltage sources and signal sources, the interconnecting unit comprising:

a substrate having a cap-zone defined by an area that is to be encapsulated by a protective casing, a plurality of contact elements arranged in the cap-zone, a plurality of ball-pads arranged in a ball-pad array outside of the cap-zone, and a plurality of conductive lines coupling the contact elements to the ball-pads; and

a barrier projecting away from a surface of the substrate outside of the cap-zone, wherein at least a portion of the barrier is adjacent to the cap-zone.

14. The interconnecting unit of claim 13 wherein the barrier comprises a film having an opening with edges bordering the cap-zone.

15. The interconnecting unit of claim 14 wherein the film is a thin tape applied to the substrate.

16. The interconnecting unit of claim 14 wherein the film is polymeric coating applied to the substrate.

17. The interconnecting unit of claim 13 wherein the barrier is a ridge formed in the substrate that surrounds the cap-zone.

18. The interconnecting unit of claim 13 wherein:

the substrate has a slot, a die-side to which the die is to be attached, and a wire-side opposite the die-side, wherein the contact elements are arranged in a contact array adjacent to an edge of the slot on the wire-side of the substrate, wherein the ball-pad array is spaced apart from the contact array on the wire-side of the substrate, and a boundary of the cap-zone is between the contact array and the ball-pad array on the wire-side of the substrate; and

the barrier comprises a film having an opening with edges bordering the boundary of the cap-zone.

19. The interconnecting unit of claim 18 wherein the film is a thin tape applied to the substrate.

20. The interconnecting unit of claim 18 wherein the film is polymeric coating applied to the substrate.

21. A interconnecting unit for electrically coupling a microelectronic die having an integrated circuit to voltage sources and signal sources, the interconnecting unit comprising:

a substrate having a cap-zone defined by an area that is to be encapsulated by a protective casing, an opening in the cap-zone, a plurality of contact elements arranged in the cap-zone along an edge of the opening, a plurality of ball-pads arranged in a ball-pad array outside of the cap-zone, and a plurality of conductive lines coupling the contact elements to the ball-pads; and

a barrier on the substrate outside of the cap-zone, wherein at least a portion of the barrier is adjacent to at least a portion of the cap-zone.

22. The interconnecting unit of claim 21 wherein the barrier comprises a film having an opening with edges bordering the cap-zone.

23. The interconnecting unit of claim 22 wherein the film is a thin tape applied to the substrate.

24. The interconnecting unit of claim 22 wherein the film is polymeric coating applied to the substrate.

25. The interconnecting unit of claim 21 wherein the barrier is a ridge formed in the substrate that surrounds the cap-zone.

26. A interconnecting unit for electrically coupling a microelectronic die having an integrated circuit to voltage sources and signal sources, the interconnecting unit comprising:

a substrate having a cap-zone defined by an area that is to be encapsulated by a protective casing and a plurality of conductive features configured to be coupled to bond-pads on the die and electrical circuitry coupled to the voltage sources and the signal sources; and

a seal on at least one side of the substrate, the seal being configured to engage a mold during a molding process for forming the protective casing in a manner that prevents a molding compound from leaking between the substrate and the mold during the molding process.

27. A packaged microelectronic device assembly, comprising:

a microelectronic die having an integrated circuit and a plurality of bond-pads on an exterior surface, at least a set of the bond-pads being operatively coupled to the integrated circuit;

a substrate having a cap-zone defined by an area that is to be encapsulated by a protective casing, a plurality of contact elements arranged in the cap-zone, a plurality of ball-pads arranged in a ball-pad array outside of the cap-zone, and a plurality of conductive lines coupling the contact elements to the ball-pads, the microelectronic die being attached to the substrate, and the contact elements being electrically coupled to corresponding bond-pads;

a protective casing covering the cap-zone; and

a gasket attached to the substrate outside of the cap-zone, wherein at least a portion of the gasket is adjacent to at least a portion of the protective casing.

28. The packaged microelectronic device of claim 27 wherein the gasket comprises a film having an opening with edges bordering the cap-zone.

29. The packaged microelectronic device of claim 28 wherein the film is a thin tape applied to the substrate.

30. The packaged microelectronic device of claim 28 wherein the film is polymeric coating applied to the substrate.

31. The packaged microelectronic device of claim 27 wherein the barrier is a ridge formed in the substrate that surrounds the cap-zone.

32. The packaged microelectronic device of claim 27 wherein:

the substrate has a slot, a die-side to which the die is to be attached, and a wire-side opposite the die-side, wherein the contact elements are arranged in a contact array adjacent to an edge of the slot on the wire-side of the substrate, wherein the ball-pad array is spaced apart from the contact array on the wire-side of the substrate, and a boundary of the cap-zone is between the contact array and the ball-pad array on the wire-side of the substrate; and

the gasket comprises a film having an opening with edges bordering the boundary of the cap-zone.

33. The packaged microelectronic device of claim 32 wherein the film is a thin tape applied to the substrate.

34. The packaged microelectronic device of claim 32 wherein the film is polymeric coating applied to the substrate.

35. A packaged microelectronic device assembly, comprising:

a microelectronic die having an integrated circuit and a plurality of bond-pads on an exterior surface, at least a set of the bond-pads being operatively coupled to the integrated circuit;

a substrate having a cap-zone defined by an area that is to be encapsulated by a protective casing, a plurality of contact elements arranged in the cap-zone, a plurality of ball-pads arranged in a ball-pad array outside of the cap-zone, and a plurality of conductive lines coupling the contact elements to the ball-pads, the microelectronic die being attached to the substrate, and the contact elements being electrically coupled to corresponding bond-pads;

a protective casing covering the cap-zone; and

a barrier projecting away from a surface of the substrate outside of the cap-zone, wherein at least a portion of the barrier is adjacent to at least a portion of the protective casing.

36. The packaged microelectronic device of claim 35 wherein the barrier comprises a film having an opening with edges bordering the cap-zone.

37. The packaged microelectronic device of claim 36 wherein the film is a thin tape applied to the substrate.

38. The packaged microelectronic device of claim 36 wherein the film is polymeric coating applied to the substrate.

39. The packaged microelectronic device of claim 35 wherein the barrier is a ridge formed in the substrate that surrounds the cap-zone.

40. The packaged microelectronic device of claim 35 wherein:

the substrate has a slot, a die-side to which the die is to be attached, and a wire-side opposite the die-side, wherein the contact elements are arranged in a contact array adjacent to an edge of the slot on the wire-side of the substrate, wherein the ball-pad array is

spaced apart from the contact array on the wire-side of the substrate, and a boundary of the cap-zone is between the contact array and the ball-pad array on the wire-side of the substrate; and

the barrier comprises a film having an opening with edges bordering the boundary of the cap-zone.

41. The packaged microelectronic device of claim 40 wherein the film is a thin tape applied to the substrate.

42. The packaged microelectronic device of claim 40 wherein the film is polymeric coating applied to the substrate.

43. A packaged microelectronic device assembly, comprising:

a microelectronic die having an integrated circuit and a plurality of bond-pads on an exterior surface, at least a set of the bond-pads being operatively coupled to the integrated circuit;

a substrate having a cap-zone defined by an area that is to be encapsulated by a protective casing, an opening in the cap-zone, a plurality of contact elements arranged in the cap-zone along an edge of the opening, a plurality of ball-pads arranged in a ball-pad array outside of the cap-zone, and a plurality of conductive lines coupling the contact elements to the ball-pads, the microelectronic die being attached to the substrate, and the contact elements being electrically coupled to corresponding bond-pads;

a protective casing covering the cap-zone and filling the opening; and

a barrier on the substrate outside of the cap-zone, wherein at least a portion of the barrier is adjacent to at least a portion of the protective casing.

44. The packaged microelectronic device of claim 43 wherein the barrier comprises a film having an opening with edges bordering the cap-zone.

45. The packaged microelectronic device of claim 44 wherein the film is a thin tape applied to the substrate.

46. The packaged microelectronic device of claim 44 wherein the film is polymeric coating applied to the substrate.

47. The packaged microelectronic device of claim 43 wherein the barrier is a ridge formed in the substrate that surrounds the cap-zone.

48. The packaged microelectronic device of claim 43 wherein:

the substrate has a slot, a die-side to which the die is to be attached, and a wire-side opposite the die-side, wherein the contact elements are arranged in a contact array adjacent to an edge of the slot on the wire-side of the substrate, wherein the ball-pad array is spaced apart from the contact array on the wire-side of the substrate, and a boundary of the cap-zone is between the contact array and the ball-pad array on the wire-side of the substrate; and

the barrier comprises a film having an opening with edges bordering the boundary of the cap-zone.

49. The packaged microelectronic device of claim 48 wherein the film is a thin tape applied to the substrate.

50. The packaged microelectronic device of claim 48 wherein the film is polymeric coating applied to the substrate.

51. A packaged microelectronic device assembly, comprising:

a microelectronic die having an integrated circuit and a plurality of bond-pads on an exterior surface, at least a set of the bond-pads being operatively coupled to the integrated circuit;

a substrate having a cap-zone defined by an area that is to be encapsulated by a protective casing and a plurality of conductive features, at least one conductive feature having a contact element coupled to corresponding bond-pad on the die, a ball-pad outside of the cap-zone, and a conductive trace coupling the contact element to the ball-pad;

a protective casing covering the cap-zone; and

a seal on at least one side of the substrate, the seal being configured to inhibit the protective casing from covering the substrate outside of the cap-zone.

52. A method of manufacturing a microelectronic device having a microelectronic die including an integrated circuit and a plurality of bond-pads coupled to the integrated circuit, comprising:

coupling the die to an interconnecting unit, the interconnecting unit having a substrate and a plurality of conductive features, the substrate having a first side and a second side, and at least a set of the conductive features each including a contact element, a conductive line connected to the contact element, and a ball-pad connected to the conductive line, the ball-pads being on the first side of the substrate wherein the die is coupled to the interconnecting unit to electrically couple the bond-pads on the die with corresponding contact elements on the substrate, and wherein the contact elements define a cap-zone that is to be encapsulated by a protective casing;

encapsulating the die and the contact elements by engaging a first bearing surface of a first mold unit against the first side of the substrate, engaging a second bearing surface of a second mold unit against the second side of the substrate, positioning the die in the second mold unit, and injecting a molding compound into at least the second mold unit; and

inhibiting the molding compound from leaking out of the cap-zone between the substrate and at least one of the first and second mold units by engaging a seal on the substrate with the one of the first and second mold units.

53. The method of claim 52 wherein:

the seal comprises a thin film having an opening with edges bordering the cap-zone; and

engaging the seal with at least one of the first and second mold units comprises contacting the one of the first and second mold units with the thin film.

54. The method of claim 52 wherein:

the seal comprises a thin tape having an opening with edges bordering the cap-zone; and

engaging the seal with at least one of the first and second mold units comprises contacting the one of the first and second mold units with the thin tape.

55. The method of claim 52 wherein:

the seal comprises a polymeric coating having an opening with edges bordering the cap-zone; and

engaging the seal with at least one of the first and second mold units comprises contacting the one of the first and second mold units with the polymeric coating.

56. The method of claim 52 wherein:

the substrate has a die-side to which the die is attached, a wire-side, and a slot from the die-side to the wire-side, the contact elements being arranged in an array on the wire-side adjacent to an edge of the slot, the ball-pads being arranged on the wire-side spaced apart from the contact elements, the cap-zone having a boundary on the wire-side between the array of contact elements and the array of ball-pads, and the seal being a thin film applied to the wire-side of the substrate, wherein the thin film has an opening bordering the cap-zone;

encapsulating the die and the contact elements comprises positioning the contact elements in a first cavity of the first mold unit, positioning the die in a second cavity of a second mold unit, injecting the molding compound into the second cavity, through a portion of the substrate, and into the first cavity to form a first protective casing over the contact elements and a second protective casing over the die; and

engaging the seal with at least one of the first and second mold units comprises contacting the first mold unit with the thin film.

57. The method of claim 52 wherein:

the substrate has a die-side to which the die is attached, a wire-side, and a slot from the die-side to the wire-side, the contact elements being arranged in an array on the wire-side adjacent to an edge of the slot, the ball-pads being arranged on the wire-side spaced apart from the contact elements, the cap-zone having a boundary on the wire-side between the array of contact elements and the array of ball-pads, and the seal being a thin tape applied to the wire-side of the substrate, wherein the thin tape has an opening bordering the cap-zone;

encapsulating the die and the contact elements comprises positioning the contact elements in a first cavity of the first mold unit, positioning the die in a second cavity of a second mold unit, injecting the molding compound into the second cavity, through a portion of the substrate, and into the first cavity to form a first protective casing over the contact elements and a second protective casing over the die; and

engaging the seal with at least one of the first and second mold units comprises contacting the first mold unit with the thin tape.

58. The method of claim 52 wherein:

the substrate has a die-side to which the die is attached, a wire-side, and a slot from the die-side to the wire-side, the contact elements being arranged in an array on the wire-side adjacent to an edge of the slot, the ball-pads being arranged on the wire-side spaced apart from the contact elements, the cap-zone having a boundary on the wire-side between the array of contact elements and the array of ball-pads, and the seal being a polymeric coating applied to the wire-side of the substrate, wherein the polymeric coating has an opening bordering the cap-zone;

encapsulating the die and the contact elements comprises positioning the contact elements in a first cavity of the first mold unit, positioning the die in a second cavity of a second mold unit, injecting the molding compound into the second cavity, through a portion of the substrate, and into the first cavity to form a first protective casing over the contact elements and a second protective casing over the die; and

engaging the seal with at least one of the first and second mold units comprises contacting the first mold unit with the polymeric coating.

59. A method of manufacturing a microelectronic device, comprising:

providing an unpackaged unit having a microelectronic die coupled to an interconnecting unit, the die having an integrated circuit and a plurality of bond-pads coupled to the integrated circuit, and the interconnecting unit having a substrate, a plurality of contact elements, a plurality of conductive lines each connected to a corresponding contact element, and a plurality of ball-pads each connected to a corresponding conductive line, wherein the die is coupled to the interconnecting unit to electrically couple the bond-pads on the die with corresponding contact elements on the substrate, and wherein the contact elements define a cap-zone that is to be encapsulated by a protective casing;

engaging a first bearing surface of a first mold unit against a first side of the substrate;

engaging a second bearing surface of a second mold unit against a second side of the substrate so that the die is received within the second mold unit;

injecting a molding compound into at least the second mold unit; and

sealing the cap-zone to inhibit the molding compound from leaking out of the cap-zone between the substrate and at least one of the first and second mold units by engaging a barrier on the substrate with the one of the first and second mold units.

60. A method of manufacturing an interconnecting unit for electrically coupling a microelectronic die having an integrated circuit to voltage sources and signal sources, the method comprising:

forming a plurality of conductive features on a substrate, the plurality of conductive features having a plurality of contact elements arranged in a cap-zone, a plurality of conductive lines, and a plurality of ball-pads arranged in a ball-pad array outside of the cap-zone, wherein each conductive line extends between a contact element and a corresponding ball-pad, and wherein the cap-zone is configured to be covered by a protective casing; and

fabricating a barrier on the substrate outside of the cap-zone so that at least a portion of the barrier is adjacent to a portion of the cap-zone.

61. The method of claim 60 wherein fabricating the barrier comprises disposing a thin film on the substrate to surround the cap-zone.

62. The method of claim 60 wherein fabricating the barrier comprises cutting an opening in a thin tape having a size configured to border the cap-zone and applying the tape to the substrate so that the opening surrounds the cap-zone.

63. The method of claim 60 wherein fabricating the barrier comprises coating the substrate with a polymeric material and forming an opening the polymeric material to border the cap-zone.

64. A method of manufacturing an interconnecting unit for electrically coupling a microelectronic die having an integrated circuit to voltage sources and signal sources, the method comprising:

forming a plurality of conductive features on a substrate, the plurality of conductive features having a plurality of contact elements arranged in a cap-zone, a plurality of conductive lines, and a plurality of ball-pads arranged in a ball-pad array outside of the cap-zone, wherein each conductive line extends between a contact element and a corresponding ball-pad, and wherein the cap-zone is configured to be covered by a protective casing; and

fabricating a raised seal on the substrate outside of the cap-zone so that at least a portion of the seal is adjacent to a portion of the cap-zone.